

light beam to impinge on the facet at a second incident angle such that a second light beam is reflected by the facet to scan a second portion of the surface of the substrate during a second time interval subsequent to the first time interval while the polygon is rotating.

Additional aspects of the present invention will become readily apparent to those skilled in this art from the following detailed description and appended claims, wherein only the preferred embodiments of the present invention are shown and described, simply by way of illustration of the best mode contemplated for carrying out the present invention. As will be realized, the present invention is capable of other and different embodiments, and its several details are capable of modifications in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Reference is made to the attached drawings, wherein elements having the same reference numeral designations represent like elements throughout, and wherein:

Figures 1a-1d schematically illustrate a polygon scanning system in accordance with an embodiment of the present invention.

Figures 2-4 schematically illustrate polygon scanning systems according to further embodiments of the present invention.

#### DESCRIPTION OF THE INVENTION

The data rate of conventional polygon scanning systems is limited, because as the number of polygon facets and/or the diameter of the incident light beam is increased, the duty cycle (i.e., the system's efficiency) decreases. The present invention overcomes the limitations on the duty cycle and data rate stemming from this trade-off inherent in conventional polygon scanning systems.

## ABSTRACT OF THE DISCLOSURE

A polygon scanning system and method is provided wherein two or more light beams impinge at different incident angles on a polygon facet and are sequentially used for scanning the surface of a substrate as the polygon is rotated. Embodiments include a system comprising a polygon having a reflective facet, a rotation mechanism for rotating the polygon, and a light source for directing a plurality of light beams to impinge on the facet such that each light beam impinges on the facet at a different incident angle. Each light beam is reflected by the facet to scan a particular portion of a surface of a substrate during a respective time interval when the rotation mechanism is rotating the polygon. Each of the plurality of light beams is reflected onto the substrate surface using a respective portion of the facet surface, such that the sum of the respective portions of the facet surface used to reflect the light beams is a very large percentage of the total surface area. Thus, the system has a duty cycle of close to 100 percent as well as a high data rate.